SYMONS'S

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METEOROLOGICAL MAGAZINE.

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"THE TIMES" ON THE DROUGHT AND ON THE RAINFALL ORGANIZATION.

[ONE of the difficulties attaching to my position is that of deciding when, and whether, any particular notice of rainfall work should be reprinted. If I do reprint notices favourable to it, I lay myself open to criticism for conceit, for "blowing my own trumpet," &c. If I do not reprint them, the encouragement to my correspondents and helpers which these comments offer reaches only those who see the originals –does not reach more than a portion of those observers without whose help my work would abruptly terminate.

The observers and I are mutually dependent; the staff would hardly have reached what it has without me, and I could have done little without the staff; therefore any favourable (or unfavourable) remarks must be shared between us, and on the whole I believe that it is my duty to run the risk of being called conceited, and, when the organization receives praise—and along therewith useful information is given, I think that it is right to give it as wide a circulation as possible.—G. J. S.]

ANOTHER DROUGHT.

To the Editor of the Times.

SIR,—Before submitting a few facts respecting the extremely dry July which has just closed, it will be well to look back a few years and recall our recent experience.

Rainfall observations have now been made uninterruptedly in this country for 160 years, not, alas! at any one place, but by careful calculation I have obtained values which are, I believe, very near the truth for every year from 1726 to 1885. During the whole of this long period there is no instance of more than five consecutive years being wet until we come to recent years, and then we have the unprecedented fact of nine consecutive years (1875 to 1883), each wetter than the average; in short, the quantity in those nine years was as great as usually falls in ten years and a quarter.

In 1884 (just as in 1834, 1844, 1854, 1864, and 1874) the fall was below the average, and complaints of drought and of deficient water supply immediately

arose. As I have dealt with this subject elsewhere, it is unnecessary to do more here than recall the recollection of the complaints in 1884.

I have not had time to thoroughly examine the records of the early months of 1885, but my impression is that up to the middle of June the fall did not differ materially from the average, but the latter half of June was very dry.

I now come to July, which has been so remarkably dry, that I am sure the facts will be examined with interest. I append them in the form of a table, with, at the end, notes by some of my correspondents. How much I am indebted to them it is needless for me to point out.

I am, Sir, your obedient servant,

G. J. SYMONS, F.R.S.

62, *Camden Square, N. W., Aug.* 3.

Rainfall in July, 1885.

County.	Station.	Average in July, 1870-79.	July, 1885.	Deficiency.
		in.	in.	in.
Middlesex	London, Camden Square	2·47	0·52	1·95
Kent	Maidstone, Hunton Court	2·04	0 21	1·83
Kent	Hythe	2·46	0 47	1·99
Hants	I. of Wight, St. Lawrence	2·48	0·70	1·78
Hants	Strathfield Turgiss	2·30	0·22	2·08
Herts	Hitchin	2·70	0·10	2·60
Bucks	Newport Pagnell	2·70	0·14	2 56
Norfolk	Swaffham	3·44	1·10	2·34
Wilts	Salisbury, Alderbury	2·75	0·16	2·59
Devon	Okehampton	3 42	2·07	1·35
Devon	Holsworthy	3 23	1·14	2·09
Gloucester	Clifton	3·25	0·97	2 28
Lincoln	Ulceby, Killingholme	2·78	0·66	2·12
York	Skipton, Arncliffe	4·95	1·43	3·52
Northumberland	North Shields	2·55	1·59	0·96
Monmouth	Newport, Llanfrechfa	3·69	0·71	2 98
Kirkcudbright	Cargen, near Dumfries	3·13	2·68	0·45
Kinross	Loch Leven	3·05	1·00	2·05
Forfar	Arbroath	2·64	0·79	1·85
Cork	Black Rock	2 84	1·32	1·52
King's County	Portarlington	2·68	1·26	1·42
Galway	Ballinasloe	2·88	2·75	0·13
Down	Waringstown	3·58	1·85	1·73

REMARKS.

HITCHIN.—The driest month since the record was begun, in 1849.
HOLSWORTHY.—The driest and finest month for many years.
ULCEBY.—A very dry month, some very hot days, but no thunder or lightning.
NEWPORT, MON.—Very hot until 28th.
CARGEN, DUMFRIES.—First half cold, second half unusually warm. Swarms of aphides.
WARINGSTOWN.—The finest haymaking season in my recollection.

G. J. S.

Leading Article in "TIMES," *of August 5th*, 1885.

"Mr. G. J. Symons writes to us this morning on a subject which is daily becoming of more serious and alarming importance. For six weeks the British Isles have been suffering from what may now be called a drought. Last year was very dry, and 1885 threatens to be drier still. During the nine previous years the country had been complaining of an excess of moisture. Rainfall observations, Mr. Symons says, have been compiled, though not

always very methodically, for a hundred and sixty years. He is in possession of statistics, more or less complete, for that long period. In the whole of it there had been till 1875 to 1883 no instance of a series of more than five wet years. Nature maintains her averages, after a somewhat rough fashion; and it appears as if the balance were about to be redressed by as extraordinary a continuity of drought. Not only here and there has the absence of rain been felt. There will always be localities which, by some accident of the geographical features, as, for example, the vicinity of more attractive hills and woods, are left occasionally unvisited by showers. Last year and this the experience has virtually been universal. South and north, east and west, have vied in dryness. Down has been parched proportionately as much as Middlesex. Monmouthshire has been as rainless as Hampshire. The barometer itself does not seem to have known what to make of the weather. It has constantly been promising relief, and has as regularly failed to keep its pledge. Some slight showers fell yesterday, [Aug. 4th], but there is no security that they are the advance guard of the downfall we need. America has so often failed to send us her storms, that it is impossible to be sanguine that the cyclone which has just done so much damage across the Atlantic will bring rain to our own fields. Our need is very great. Wells half emptied by the demands of last year are positively dry in many quarters now. Water refused by the clouds has been imperatively needed for cattle and gardens, and has had to be fetched, often from great distances. Nobody can tell how the kingdom will fare unless the clouds descend. The fear is that they may reserve their bounty until it will be like the shower of gold on Danae's head, and kill the harvest it is wanted to enrich.

"Want of rain is reducing the meadows to the apparent condition of a Board school playground. It burnt up the strawberries, and keeps the apples thin and withered. It is attenuating the straw and grain in the cornfields. Under its influence a premature autumn is settling down upon the foliage. Yet agriculturally there are compensations. A drought gives a light hay crop double sweetness and nutritiousness. Grain is better for being roasted than for rotting. If roots offer at present a most lugubrious appearance, they enjoy wonderfully recuperative properties. They are not of a sensitive temper like wheat and grass. They do not sulk and refuse to drink because the clouds have deferred their hospitality. Weather lore always cuts both ways. If "a wet August never brings dearth," so too "a dry August and warm doth harvest no harm." Though certainly a dry August would be more beneficial had a moderately wet July preceded, there is hope still for agricultural prospects, looked at from an exclusively agricultural point of view. In a country like the United Kingdom, which from its insular situation has an atmosphere never utterly destitute of a share of moisture, a state of things such as prevailed before 1884 is alone altogether irremediable. This is the more worth recollecting that the other than purely agricultural grievances of a drought are of an extent to require every consolation which can by any ingenuity be imagined. Want of rain causes innumerable inconveniences, some slight, some considerable, and all most irritating. Water is so entirely a necessity that a dearth of it is resented as an actual cruelty. Englishmen expect to have enough of it to waste as well as use. They cannot endure to be allowanced in respect of water more than of air. In ordinary circumstances, the largeness of the normal British water supply is not in the least appreciated. As soon as it begins to

fall off, an Englishman recognizes at every turn by a succession of shocks how marvellously unpleasant it is to be stinted. Individuals speedily find themselves personally incommoded in the country and in the smaller centres of population the moment that a drought has declared itself. It is no light matter in a country house to discover that the cisterns are all but empty and to watch the neighbouring stream declining into mud. When a river like the Thames is so exhausted that Bank holiday excursionists afloat incur at all events no danger of drowning, smaller currents may be supposed to have disappeared altogether. In places such as London a drought manifests its effects in a worse though less direct way. Townsmen need rain not merely to supply the water they drink and wash in, but as a master scavenger. Occasional deluges are the sole adequate instruments for cleansing cities like London and Manchester, Glasgow, and Liverpool. After a period of dry weather humanity in masses is as refreshed by a copious downpour as vegetation. The most casual observer cannot walk through the town, its wealthy as much as its squalid quarters, after an interval of good steady rain without a consciousness of a stir and renewal of life. He is no longer afraid to open his nostrils to the breeze. The air has been washed; and he can perceive the effects on the whole population. Should cholera invade the kingdom, it may sincerely be hoped that at any rate it will delay its arrival until the clouds have finally decided to descend. Its attacks will be resisted with a vastly increased probability of success if the land can first have indulged in a plentiful bath. Rain cannot come too quickly both for the purposes of health and for those of agriculture. Except on some early ripening land, rain not abnormally heavy would not hurt the crops, and might swell the ears. For sanitary considerations its prompt advent is all-important. No urban inspector of nuisances approaches it in efficiency. Not merely does it infallibly detect them, but it abates them of its own authority by one and the same act.

"No means have been, or are likely to be, discovered for compelling the clouds to fall, unless at their own good pleasure, or for dispensing with the supplies they bring. Man, however, is not equally helpless in the distribution of their contents. He can so regulate them that the superfluity of one season shall compensate the deficiency of another. When a sufficient period is taken the kingdom can be shown to have just the amount it needs. Unfortunately, the superabundance is a trouble, and not an advantage, when no sufficient arrangements exist for spreading it over the lean dry seasons. Englishmen have been tempted, by the ease with which in general they obtain from nature all the water they need, to take much less pains than less favoured populations about water storage. An Egyptian peasant, if his fancy could be made to comprehend the golden flood which in Great Britain for many months of the driest years is let roll unheeded into the narrow seas, would think a British farmer the most unreasonable of beings for grumbling at a water scarcity in June and July. A proper system of reservoirs would put an end to many of the evils and burdens which rural England sustains from periods of drought like those of 1884 and 1885. Formerly the topic of the national water supply was involved in inextricable obscurity from the absence of statistics. Mr. G. J. Symons has been foremost in dispelling the darkness. He has devoted a laborious life to the scientific collection of the particulars of the British rainfall. He has brought order into the chaos of the past. At the head of an army of reporters of all ranks, from the Speaker and the Secretary of State for War to

humble clerks, he has rendered it extremely hard for a single shower in these islands to elude his census. His annual summaries of the "Distribution of Rain over the British Isles," as observed at more than two thousand stations, since 1860, compose a library full of the most valuable instruction, both sanitary and agricultural. The volume for 1884 (Stanford and Simpkin, Marshall, and Co.) has just been published, and is of especial interest owing to last year's drought and thunderstorms. In a season like this, when the land is crying out piteously with thirst for the water it let not long ago run in unregarded floods into the sea, Mr. Symons's volumes would be rather melancholy reading, if the superabundance they record did not point to a mode of correcting the defectiveness with which nature is in the habit of balancing it."

[We have been favoured with several valuable letters respecting the drought, which we shall have the pleasure of inserting next month.—ED.]

THE DROUGHT AT BASLE IN 1884.*

THIS pamphlet is noticeable chiefly for the details which it gives respecting the deficient rainfall of 1884. Dr. Riggenbach begins his remarks by describing it as the driest year since observations were begun in 1864, and as having four inches less rain than that year; in fact the total fall was only 19·40 inches, and as the average (20 years) is 32·25 it was 41 per cent. below the average, there was only one month, September, which had more than the average. Both as regards number of rainy days, and especially as regards quantity, 1884 must be considered as extremely dry, yet (excepting in March) there was no long rainless period during the year.

This long-continued short supply of rain caused a general diminution in wells and streams. The so-called "Hungerbäche" near Riehen and Liestal, which during the recent wet years had been in flood, dried up. Around Pruntrut on the northern slope of the Jura there was great want of water, and in Seltisberg, situated on an isolated plateau, the inhabitants had to buy it. The level of most of the lakes fell considerably; at Rapperswill on the Lake at Zurich, the boats could not get into the harbour. The bed of the Emme at Burgdorf was dry. At Aarburg, the Aar was lower than it had been since 1753.

The following are a few of the leading numerical data.

Temperature.		*Various.*	
Absolute max. : July 19th	95°·0	Mean humidity	80
Mean ,,	5·88	,, cloud	6·3
Yearly mean	49·9	Total rainfall	19·40 in.
Mean min.	43·2	Days with rain	167
Absolute min. . Dec. 1st	16·7	Prevailing wind	S.E.

* Witterunsbericht des Jahres 1884, Von A. Riggenbach. Basel J. G. Bauer, 1885. Excerpt Verhand. d. Naturf. Ges. in Basel VII Theil 3 Heft.

DROUGHT AND WEATHERCOCKS.

THERE are probably few who read the above title who can guess why we have chosen it.

The connection does not always exist; some weathercocks are entirely independent of drought or floods, and some are very seriously affected; the former are those which do not carry any of the usual letters N, E, S, W, or which are wholly of metal, and carried on metal or stone supports.

The weathercocks which suffer from drought are those which have the cardinal points indicated by the letters, and which (though themselves of metal) are carried at the summit of a tall pole. The pole, under the influence of sun and drought, splits, and the cracks run *nearly* along its length, but not precisely; they are slightly inclined, and all run parallel; if the drought is prolonged, they become numerous, and, though no *one* crack may be a tenth of an inch, the aggregate amount becomes large. We have ourselves measured one of which the letters were, during the July drought, carried round 44°; the S letter was carried round until it pointed almost exactly S.W. With subsequent moisture the cracks have partly closed, and possibly by November the letter S will be nearly back in its true position, but as to this we have no knowledge.

It is evidently necessary for observers to watch for the occurrence of this somewhat strange error.

THE INFLUENCE OF FORESTS ON CLIMATE.

The third number of *Petermann's Mittheilungen* for this year contains an article by Herr A. Woeikof on the influence of forests on climate. The commencement of a scientific investigation of this subject was made when the Bavarian forest meteorological stations were established, and when Prussia, Alsace-Lorraine, France, Switzerland, and Italy followed the example. As a general rule it may be laid down that in the warm seasons, as between forests and places close at hand which are treeless—1. The temperatures of the earth and air are lower in the former; 2. Their variations are less; 3. The relative humidity is greater. After examining observations as to evaporation, Herr Woeikof states that the influence of forests in diminishing evaporation from water and the soil is so great that it cannot be accounted for alone by the lower temperature of the hot months, the greater humidity, or even by the shade. An important influence, which has hitherto been but little appreciated, is the protection from the wind afforded by the trees, and this the writer regards as more important than all the others together in reducing the degree of evaporation. With regard to the influence of forests on rain and snowfall, there is as yet only a single series of observations supplying comparative statistics, and extending over a sufficiently long period. These were taken in the neighbourhood of Nancy, and they show an important influence of forests in increasing the rainfall.

It might appear that the effect of forests on rain in the climate of Central Europe in winter would be small, for the difference between the temperature

and humidity of the forest and the open is very little, and the quantity of moisture in the atmosphere is small. But the observations show that it is at this time of the year that forests get much more rain. This the writer attributes to the clouds being lower, the resistance which the forest offers to the movement of the air, and to the moist west wind. Forests retain rain by the undergrowths of grass, moss, &c., much better than open ground, and let water off superficially only after a heavy rainfall; the remainder filters upwards slowly, and much of it is used for the evaporation of the trees. Although forests, especially thick luxuriant forests, cannot exist without certain supplies of moisture, yet it is the same to them when the supplies come, for they retain what they get, and use it over a long period. One example of this is the Lenkoran forest on the west coast of the Caspian, where the vegetation is more luxuriant than in any other part of Europe, yet very little rain falls in summer, but the rainfall in autumn and winter is great. The water is stored up by the forest, and is used in evaporation during the heat of summer. Humidity of the atmosphere, however, is not inconsistent with a high temperature, as the Red Sea shows; but in forests the humidity is due to the evaporation of the leaves—in other words, to a process by which heat is converted into work, and hence the coolness.

Herr Woeikof then endeavours to ascertain the influence of forests on the climatic conditions of their neighbourhoods in the western parts of the Old World, between the 38th and 52nd degrees N. latitude, the places selected being in all cases in the open. Thus for the 52nd degree eight stations are taken between Valentia in Ireland on the west and the Kirghiz steppes on the east; for the 50th, Guernsey on the west, Semipalatinsk on the east, and thirteen stations, and so on for each two degrees of latitude to 38°. The general result of the observations in fifty stations in six different degrees of latitude is that in Western Europe and Asia large forests have a great influence on the temperature of places near them, and that by their influence the normal increase of temperature as we travel eastward from the Atlantic Ocean to the interior of the continent is not merely interrupted, but they give places far removed from the coast a cooler summer than those actually on the sea. A striking example of this is Bosnia. An examination of the statistics shows—1. That in Bosnia the summer is 2°·5 to 4°·5 cooler than in Herzegovina; 2, Even on the island of Lissa, in the full influence of the Adriatic Sea, the summer temperature is more than a degree higher than that of Bosnia, which is separated by lofty mountain ranges from the sea. Bosnia owes this comparatively cool summer to its great forests, whilst Herzegovina is almost disafforested. To sum up: forests exercise an influence on climate which does not cease on their borders, but extends over a larger or smaller adjacent region according to the size, kind, and position of forest. Hence man by afforestation and disafforestation can modify the climate around him; but it is an extreme position to hold that by afforestation the waste places of the earth can be made fertile. There are places incapable of being afforested, which would not give the necessary nourishment to trees.—*Nature.*

HEAT AND DRYNESS OF JULY 26TH.

To the Editor of the Meteorological Magazine.

SIR,—I do not know whether the following thermometer readings are remarkable, but as I fancy it is not often that in England the difference between dry and wet bulb readings amounts to between 18° and 19°, I send them. The 26th was the hottest day we have had here since I began observations in 1882, the next having been the 8th of August, 1884, when the max. was 84°·9. I kept the house comparatively cool by shutting doors and windows and pulling down blinds, and the feeling, when the door was opened to go out, was that of facing a furnace. After 3 p.m. the sea breeze began to have some effect, till the land breeze again set in, as it did immediately after the calm at 6 p.m., and then for a time the air became drier, till radiation began to cause the formation of dew.

The thermometers (by Casella) are fine and sensitive instruments with cylindrical bulbs and long scales, graduated to fifths of a degree so as to be easily read. I have had them some 25 years and they were last verified at Kew in September, 1881, and so I fancy are as correct as can be. They are in a Stevenson's screen placed on a small plot of grass in the kitchen garden, which has the sun all day at this time of year, excepting for a short time after sunrise and before sunset.—Yours very truly,

R. H. BARNES.

Heatherlands, Parkstone, Dorset, July 27th, 1885.

Temperature, &c., at Parkstone, near Poole, Dorset, July 26th, 1885.

26th July, 1885.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Wind.		Cloud.	
					Direction.	Force.		
	°	°	°					
7 a.m.	68·2	62·9	58·7	72	N.N.E.	1 to 2	0	Dew.
9 ,,	77·5	68·1	61·6	58	,,	,,	,,	
11 ,,	84·4	68·2	57·5	40	,,	,,	,,	
1 p.m.	87·1	70·1	59·2	39	S.S.E.	1 to 2	1	
1.20 ,,	85·7	67·7	56·0	37	,,	,,	,,	
1.25 ,,	86·4	67·5	55·3	35	,,	,,	,,	
2.15 ,,	88·0	69·5	57·7	36	,,	,,	,,	
3 ,,	86·7	69·1	57·7	38	S.S.W.	1	1	
4.35 ,,	84·4	71·8	63·5	50	,,	,,	,,	
6 ,,	80·8	69·9	62·5	54	Calm.	0	0	
7.15 ,,	76·6	63·7	54·6	47	N.N.E.	1	0	
9 ,,	69·0	62·3	57·1	66	,,	,,	,,	Slight dew.
11 ,,	62·7	59·3	56·4	80	N.N.E.	0 to 1	0	Slight dew.

P.S.—Max. in screen, 88°·0; max. in sun: black bulb, 125°·9, bright bulb, 97°·8 (enclosed in glass jacket).

ATMOSPHERIC ELECTRICITY.

To the Editor of the Meteorological Magazine.

SIR,—Noticing a reference in your current number to the subject of atmospheric electricity, it occurred to me that you might be interested to know of some experiments in that regard which have been tried here. The collecting sources are two—

(1) A long cane carrying a brass ferule armed with three fine platinum points, elevated some 30 feet above the ground, on a building situated near the Observatory.

(2) A tower situated on a rounded eminence, 620 ft. to the N. of the Observatory, its base being 55 ft. above it.

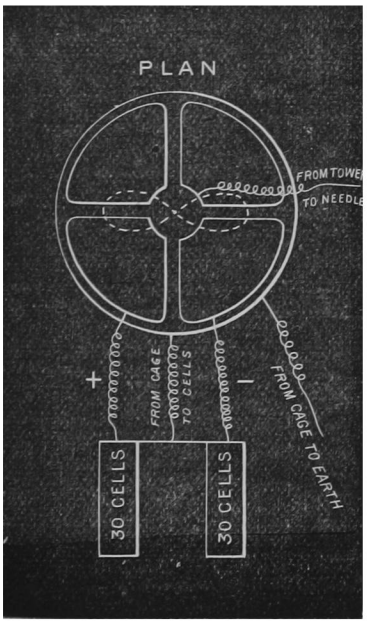
The conducting wires are of copper, gutta percha covered, and are led into the Observatory. The cane on the building is insulated, by being divided by a vulcanite stem protected by a copper funnel, the wire passing inside the upper half.

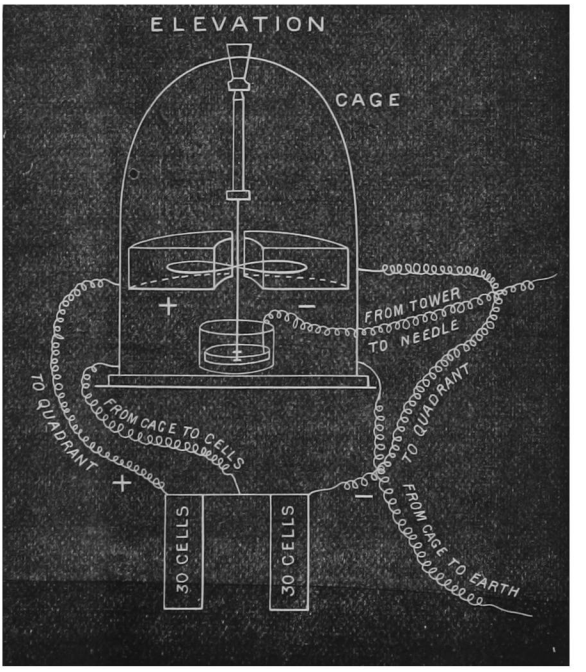
The pole on the tower terminates in a corona of 25 platinum points, and this is insulated by being placed on a glass rod, which runs through a Mascart bottle filled with sulphuric acid. The corona is about 30 ft. above the base of the tower.

The receiving apparatus is of three sorts—

(*a*) A Bohnenberger electrometer composed of a single gold leaf suspended between the opposite poles of two Zamboni's piles.

(*b*) A pith ball electrometer, consisting of two gilded pith balls suspended in contact by fine platinum wires.





(*c*) A Thomson quadrant electrometer of simple form, in which the ordinary arrangement is reversed, the needle being used to test the wire, while the opposite pairs of quadrants are kept permanently charged by two of De La Rue's chloride of silver batteries of 30 cells each, connected at centre to earth.

The needle carries a mirror, and the deflections are read off on a scale in the usual way. The instruments are usually examined at 9 a.m., and specially as occasion offers.

The Bohnenberger is the most sensitive, and is affected by small currents. The pith balls are used as these are found stronger. The quadrant is employed for measurement of quantity and duration of current. Generally the lower points are found to give stronger indications than those on the Tower, which I attribute to the greater resistance in the longer length of wire.

In calm weather the electricity is usually feeble and Positive. In broken weather Negative electricity is oftener developed; but sometimes the sign changes rapidly. On one occasion at least I have found the upper and lower points of opposite signs simultaneously. As a shower of rain or hail comes on, the current strengthens, and sparks now and then fly from the wires. Once my assistant obtained long ones from the wire, and rapid discharges from a pint Leyden jar, coupled up to it. The quadrant arrangement seems a useful one, as avoiding the need of a "replenisher," and as affording a constant charge; and I have every reason to be satisfied with it.

I have not at present examined and arranged the results obtained since the apparatus has been at work, but I hope to do this shortly in connection with the general meteorological observations taken at the same time. We seldom get heavy storms, as they are apparently broken up by the Hogs' Back and opposite hills; and cases of lightning injury are rare. I have not yet tried a small captive balloon, but probably valuable results might be had by thus extending the exploring height. The observatory (51° 13′ 39″·2 N.; 0° 28′ 47″ W.) faces south on the spur of the Hogs' Back, and is 150 feet above Guildford town, and 250 feet super mare. Booker's Tower is marked on Ordnance Map, B M. 305 ft. 5 in.

J. RAND CAPRON.

Guildown Observatory, July 18th, 1885.

ATLANTIC TIDES AS STORM WARNINGS.

To the Editor of the Meteorological Magazine.

SIR,—Supposing that you do not approve of long discussions, I, in reply to Mr. Brenan's rejoinder in last *Meteorological Magazine*, beg merely to remark that I made no reference to, because I do not believe in, *suction* either at sea or in a common pump.

When we get satisfactory proof in favour of the statements advanced in Mr. Brenan's last two paragraphs, I shall be forced to change my views. HENRY MUIRHEAD, M.D.

Cambuslang.

THE LONDON THUNDERSTORM OF JULY 13TH.

A very local heavy rain occurred about 9 p.m. on July 13th. We have not heard any evidence proving that the fall could claim an entirely exceptional character, but there can be no doubt that, for a short time, very heavy rain fell. Unfortunately there is no self-recording rain gauge within the City boundaries, and the only one in London is that at Camden Square, two miles and a half N.W. of St. Paul's. There are three ordinary rain gauges in the City, and the total collected by each was as follows :—

St. Luke's, Old Street, E.C., 1·19 in. (the storm lasted from 9 to 9.30 p.m.)
The Guildhall, E.C., 1·24 in.
The Guildhall, E.C., 1·18 in. (this gauge is 51 feet above ground.)

Of non-instrumental records—*i.e.*, verbal statements—the strongest are—"In Queen Victoria Street, E.C., the rain fell faster than the gutters could carry it away, so that even in well-built premises it overflowed the gutters, burst through the roofs, and ran downstairs;" and, "A considerable portion of Farringdon Street, long after the storm, was impassable to foot passengers."

At Camden Square there was a mere shower; the total fall was only ·07 in., and the Casella recording gauge shows that it began at 8.20 p.m., mostly fell before 9, and ceased entirely at 9.15 p.m.

The following list gives such metropolitan records as have been received. Stations in the usual order :—

	in.		in.
Lansdowne Crescent, W.	·02	Camden Square, N.W.....	·07
S. Kensington (Inventions Ex.)	·09	Camden Road, N.	·22
Guildhall, E.C.	1·24	58, Clapton Common, N.	·30
,, (Roof)	1·18	Brixton (Acre Lane)	·00
Old Street, E.C	1·19	Greenwich (Royal Obs.)	·06
Regent's Park (Roy. Bot. Soc.)	·24		

A RAILWAY TRAIN OVERTURNED BY WIND.*

(Wochenschrift des österreichischen Ingenieur- und Architekten Vereins, 13th December, 1884, p. 336.)

A TRAIN consisting of nine vehicles left Vienna at 6.30 a.m. on December 10, 1884, by the Vienna and Auspang line. Near the Biedermannsdorf Station the last four vehicles were blown off the line, and thrown down an embankment 5 yards high; as the coupling gave way the rest of the train remained upon the metals. Three of the vehicles blown off were passenger carriages, and the fourth was a goods van; the former weighing about 8·3 tons each, and the latter about 5·9 tons. The surface exposed to the wind was 161 square ft. in the case of the passenger carriages, and 178 square ft. in the case of the van. The leverage of the wind pressure may be taken at 6 ft. 7 in., which gives 43·2 lbs. per square foot for the passenger carriage and 27·9 lbs. per square foot for the goods van, as the wind-pressure necessary for over-turning. W. B. W.

* Foreign Abstracts. Inst. C.E. 1885.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JANUARY, 1885.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		0–10
England, London	53·3	29	22·8	22	41·0	32·2	33·2	88	67·1	16·8	1·43	16	8·1
Malta	65·5	17	40·7	21	57·8	47·2	44·9	81	117·2	33·8	4·28	14	4·1
Cape of Good Hope	102·0	28	52·5	8	85·0	61·7	...	...	...	...	·42	1	2·5
Mauritius	86·0	18	69·2	4	83·3	73·7	70·1	78	140·0	60·3	6·70	16	6·4
Calcutta	83·0	28	51·8	7	78·5	57·7	56·6	73	137·5	37·4	·42	1	1·4
Bombay	84·8	23	61·6	11	81·2	67·4	65·1	72	138·8	51·2	·00	0	0·7
Ceylon, Colombo	90·0	20*a*	68·8	2	88·0	72·2	66·4	63	146·5	60·0	1·74	7	4·9
Melbourne	98·4	12	42·0	28	76·7	53·7	51·2	64	156·4	30·2	·75	3	4·8
Adelaide	98·4	3	48·6	18	84·2	57·5	47·6	43	156·2	39·2	·23	3	2·8
Wellington	72·3	18	46·0	13	67·2	53·4	...	...	147·0	40·0	1·85	12	...
Auckland	77·0	20	50·0	14	71·4	57·4	52·3	65	143·0	42·0	1·91	9	5·8
Jamaica	89·5	14	61·3	10	85·4	67·3	67·4	78	...	54·2	·11	...	2·9
Barbados	79·0	var.	67·0	var.	78·0	69·0	68·3	78	140·0	...	2·73	18	5·0
Toronto	44·2	6	—16·1	22	24·3	9·9	16·0	80	103·0	—17·0	2·79	19	...
New Brunswick, Fredericton	45·9	1	—22·5	31	22·9	0·3	11·8	84	...	...	4·05	15	5·2
Manitoba, Winnipeg	35·0	4	—46·0	1	—3·1	—23·3	—4·0	97	...	...	·23	3	2·5
British Columbia, Victoria	54·0	31	22·0	11	42·1	32·7	...	...	...	...	9·15	14	...

a And

REMARKS, JANUARY, 1885.

MALTA.—Mean temp. 51°·8; mean hourly velocity of wind 11·1 miles; sea temp fell from 63° to 60°. TS on 16th, H on 8th and 16th, slight fog on 22nd. J. SCOLES.

Mauritius.—Rainfall ·66 in. above, and temp. 0°·4 below average; mean hourly velocity of wind two miles below average; extremes 28·1 miles and 1·9 mile, prevailing direction E. to E.N.E. T on six days, L on six days C. MELDRUM, F.R.S.

COLOMBO.—TSS on 28th and 29th, and L on seven other days. J. H. SYMONDS.

Melbourne.—Mean temp. of air 2°·0, and of dew point 1°·5, and rainfall ·97 in. below average; humidity average, pressure slightly above, and amount of cloud slightly below average. Prevailing winds S. and S.W., strong on three days. T on one day, L on two, heavy dew on two. R. L. J. ELLERY, F.R.S.

Adelaide.—One of the most remarkable summers ever experienced. In January the shade temp. did not once reach 100°, and on only seven days did it reach 90°, while in December it exceeded 90° on only four days; the mean temp. of both months was nearly 4° below the average. Pressure slightly above average, the max. (30·409 in.) being the highest on record for January. A severe storm traversed the northern portions of the Colony during the latter part of the month, accompanied by heavy rains, which caused floods and considerable damage. C. TODD.

Wellington.—On the whole fine, though showery in the early part; ·59 in. of R fell on 13th, the max. for the month. Prevailing winds S.E. and N.W., stormy on 7th and from 23rd to 27th. Rainfall 1·34 in., and mean temp. (60°·3), 2°·6 below average; pressure slightly above average; earthquake on 15th. R. B. GORE.

Auckland.—On the whole a fine month with small rainfall; pressure above the average, mean temp. below it. T. F. CHEESEMAN.

BARBADOS.—Rainfall 40 per cent. below average, ·56 in. on the 3rd being the max. fall; mean temp. (73°·3) 6°·3 below average; pressure steady. Prevailing wind N.E., mean hourly velocity 11·4 miles, extremes 16·7 miles and 2·5 miles. Four days cloudy and showery. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL, JULY, 1885.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	·55	XI.	Rhayader, Nantgwillt..	1·26
,,	Margate, Birchington...	·27	,,	Carno, Tybrith	1·48
,,	Littlehampton	·36	,,	Corwen, Rhug	1·09
,,	Hailsham	...	,,	Port Madoc	3·52
,,	I. of W., St. Lawrence.	·70	,,	I. of Man, Douglas	2·33
,,	Alton, Ashdell.....	·22	XII.	Stoneykirk, Ardwell Ho.	2·41
III.	Winslow, Addington ...	·37	,,	Melrose, Abbey Gate...	1·36
,,	Oxford, Magdalen Col...	·18	XIII.	N. Esk Res. [Penicuick]	1·40
,,	Northampton	·34	XIV.	Ayr, Cassillis House ...	...
,,	Cambridge, Beech Ho...	·92	,,	Glasgow, Queen's Park.	1·47
,,	Wisbech, Bank House..	·58	XV.	Islay, Gruinart School..	2·13
IV.	Southend	...	XVI.	St. Andrews, Newton Bk.	·74
,,	Harlow, Sheering	·38	,,	Balquhidder, Stronvar..	2·86
,,	Rendlesham Hall	·40	,,	Dunkeld, Inver Braan..	·79
,,	Diss	·72	,,	Dalnaspidal H.R.S. ...	1·04
,,	Swaffham	1·10	XVII.	Keith H.R.S.	1·32
V.	Salisbury, Alderbury...	·16	,,	Forres H.R.S.	·74
,,	Warminster	·18	XVIII.	Strome Ferry H.R.S....	2·76
,,	Calne, Compton Bassett	·34	,,	Lochbroom	1·27
,,	Ashburton, Holne Vic..	·69	,,	Tain, Springfield.....	1·11
,,	Holsworthy, Clawton...	1·14	,,	Loch Shiel, Glenaladale	5·39
,,	Hatherleigh, Winsford.	1·56	,,	Invergarry	2 30
,,	Lynmouth, Glenthorne.	·50	XIX.	Lairg H.R.S.	1·21
,,	Probus, Lamellyn	·46	,,	Forsinard H.R.S.	1·54
,,	Wincanton, Stowell Rec.	·26	,,	Watten H.R.S.	1·30
,,	Wells, Westbury.....	·61	XX.	Dunmanway, Coolkelure	3·18
VI.	Bristol, Clifton	·97	,,	Fermoy, Gas Works ...	1·01
,,	Ross	·31	,,	Tralee, Castlemorris ...	1·57
,,	Wem, Sansaw Hall.....	·67	,,	Tipperary, Henry Street	1·50
,,	Cheadle, The Heath Ho.	·67	,,	Newcastle West	1·28
,,	Worcester, Diglis Lock	·19	,,	Miltown Malbay.....	4·26
,,	Coventry, Coundon	·03	,,	Corofin	...
VII.	Melton, Coston	·11	XXI.	Carlow, Browne's Hill..	1·40
,,	Ketton Hall [Stamford]	·17	,,	Navan, Balrath	·72
,,	Horncastle, Bucknall ...	·75	,,	Mullingar, Belvedere ...	2·11
,,	Mansfield, St. John's St	·54	,,	Athlone, Twyford	3·50
VIII.	Macclesfield, The Park.	1·79	XXII.	Galway, Queen's Col....	4·50
,,	Walton-on-the-Hill.....	1·99	,,	Clifden, Kylemore	6·32
,,	Lancaster, South Road.	2·07	,,	Crossmolina, Enniscoe..	3·81
,,	Broughton-in-Furness ..	...	,,	Carrick-on-Shannon ...	1·69
IX.	Wakefield, Stanley Vic.	·93	XXIII.	Dowra	...
,,	Ripon, Mickley	1·06	,,	Rockcorry.....	...
,,	Scarborough.....	·86	,,	Warrenpoint	1·65
,,	East Layton [Darlington]	·60	,,	Newtownards	1·75
,,	Middleton, Mickleton..	·77	,,	Belfast, New Barnsley .	2·32
X.	Haltwhistle, Unthank..	1·69	,,	Cushendun	1·45
,,	Shap, Copy Hill	2·88	,,	Bushmills	1·87
XI.	Llanfrechfa Grange	·71	,,	Stewartstown	2·33
,,	Llandovery	1·86	,,	Buncrana	1·61
,,	Castle Malgwyn	1·03			

JULY, 1885.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·52	— 1·95	·25	11	6	90·4	26	47·6	9	0	0
II.		Maidstone (Hunton Court)...	·21	— 1·83	·13	12	3	...	...	...	...	..	...
,,		Strathfield Turgiss	·22	— 2·08	·10	11	5	90·1	26	42·3	9	0	0
III.		Hitchin	·10	— 2·60	·09	11	2	83·0	26	44 0	22*f*	0	...
,,		Banbury	·10	— 2·88	·09	18	2	85·0	26	46·0	1,9	0	...
IV.		Bury St. Edmunds (Culford)	1·26	— 1·71	·36	12	10	86·0	11*b*	40·0	22*f*	0	...
,,		Norwich (Cossey)	1·05	— 1·70	·44	13	9	83·0	25	40·0	1	0	0
V.		Weymouth(LangtonHerring)	·25	...	·15	19	5	...	...	...	...	...	...
,,		Barnstaple.....	·94	— 2·61	·27	18	6	90·0	29	45·5	9	0	...
,,		Bodmin	·82	— 2·62	·30	7	11	81·0	26	43·0	14	0	0
VI.		Stroud (Upfield)	·35	— 2·49	·13	18	5	88·0	26*c*	43·0	16	0	...
,,		ChurchStretton(Woolstaston)	·63	— 2·40	·23	7, 19	4	81·0	25*d*	44·5	1, 14	0	0
,,		Tenbury (Orleton)	·33	— 2·58	·19	7	6	88·2	25	38·7	14	0	0
VII.		Leicester	·13	...	·11	19	3	90·8	25	...	...	0	...
,,		Boston	·52	— 2·01	·17	19	5	93·0	25	45·0	2	0	0
,,		Grimsby (Killingholme).....	·66	— 2·12	·27	19	8	81·0	25	47·0	2	0	...
,,		Hesley Hall [Tickhill].....	·36	...	·19	19	3	89·0	26	43·0	31	0	...
VIII.		Manchester (Ardwick).....	1·42	— 2·39	·64	19	8	81·0	26	46·0	14	0	0
IX.		Wetherby (Ribston Hall) ..	1·04	— 1·57	·82	20	4	...	...	...	...	...	...
,,		Skipton (Arncliffe)	1·43	— 3·52	·51	19	8	83·0	25	38·0	13	0	...
X.		North Shields	1·59	— ·96	·38	26	11	81·0	25	41·5	1	0	0
,,		Borrowdale (Seathwaite).....	11·90	+ 3·13	4·04	7	12	80·5	25	44·5	14	0	...
XI.	WALES.	Cardiff (Ely).....	·89	— 2·93	·36	18	5	...	...	...	...	...	...
,,		Haverfordwest	1·48	— 2·45	·97	7	6	80·0	27	37·0	13	0	1
,,		Plinlimmon (Cwmsymlog) ...	2·99	...	1·00	18	8	...	...	...	...	..	...
,,		Llandudno.....	1·57	— 1·14	·63	19	7	75·5	26	45·0	14	0	...
XII.		Cargen [Dumfries]	2·68	— ·45	·49	6*a*	13	80·8	24	38·6	1	0	...
,,		Jedburgh (Sunnyside).....	1·21	— 1·72	·39	18	8	82·0	24*e*	43·0	28	0	...
XIV.		Douglas Castle (Newmains)	1·27	— 2·02	·55	18	8	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory)	3·04	— 1·50	·65	11	14	...	...	...	..	...	...
,,		Oban (Craigvarren)	2·88	...	·66	6	17	75·5	30	44·0	20	0	...
,,		Mull (Quinish).....	3·87	...	·68	14	18	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·00	— 2·05	·40	8	5	...	...	...	...	...	...
,,		Arbroath	·79	— 1·85	·20	7	8	81·0	25	43·0	1	0	...
XVII.		Braemar	·84	— 2·02	·21	17	9	81·0	24	35·8	1	0	...
,,		Aberdeen	1·49	...	·54	3	14	83·0	25	43·0	20	0	...
XVIII		Skye (Sligachan)	...	...	...	...	...	...	...	...	...	...	...
,,		Culloden	·48	— 2·30	...	...	...	78·5	25	43·4	23	0	0
XIX.		Dunrobin	1·82	...	·65	16	11	72·8	2	40·0	8	0	...
,,		Orkney (Sandwick)	1·52	— 1·14	·29	17	16	67·9	25	...	...	0	1
XX.		Cork (Blackrock)	1·32	— 1·52	·72	6	11	93·0	26	40·0	11	0	...
,,		Dromore Castle	2·12	...	1·00	6	5	77·0	30	45·0	24	0	...
,,		Waterford (Brook Lodge) ...	1·66	...	·72	6	9	79·5	27	39·0	18	0	3
,,		Killaloe	2·30	...	·67	19	14	80 0	25	48·0	12	0	...
XXI.	IRELAND.	Portarlington	1·26	— 1·42	·39	19	11	83·0	26	43·0	1	0	...
,,		Dublin (FitzWilliam Square)	1·15	— 1·27	·54	19	10	77·0	25	44·7	1	0	0
XXII.		Ballinasloe	2·75	— ·13	·67	19	15	75·0	24*e*	41·0	14	0	...
XXIII		Waringstown	1·85	— 1·73	·40	10	12	85·0	25	40·0	11	0	0
,,		Londonderry (Creggan Res.).	2·24	...	·66	10	16	...	...	...	...	...	...
,,		Omagh (Edenfel)	1·83	— 1·42	·62	10	17	78·0	24	37·0	13	0	..

a And 13, 17. *b* And 25, 26. *c* And 27. *d* And 26. *e* And 25. *f* And 23. *g* And 28.
+ Shows that the fall was above the average; — that it was below it.

METEOROLOGICAL NOTES ON JULY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—The weather of the month was decidedly satisfactory for the wheat crop, for there was sufficient rainfall for this grain, though not enough for oats and barley. All root crops wanted rain badly at the close. Potatoes very small. Oats cut on 20th, wheat on 25th.

HITCHEN.—The driest month since the record was commenced in 1849.

BANBURY.—Mean temp. (63°·0) 1°·5 above the average. Rainfall the least ever recorded here; harvest (oats) commenced at the end of the month; high wind on 15th, 16th and 19th.

CULFORD.—Vegetation suffered much from want of R, that which fell from 11th to 13th not being sufficient to cause any improvement.

LANGTON HERRING.—With the exception of May, 1876, when ·18 in. of R fell, and November, 1879, when only ·08 in. fell, this was the driest month in the last 11 years. Mean temp. 0°·2 above the average of 13 years; the 26th and 27th were very hot; the max. of the 27th having been reached twice in the last 13 years, viz., on August 16th, 1876, and on July 15th, 1881, but never exceeded. The steadiness of pressure was remarkable. Hay carried in perfect weather; a good prospect for the wheat harvest.

BODMIN.—Mean temp. 60°·2. Magnificent weather during the whole month, and high, steady pressure.

STROUD.—A fine, hot, dry month; vegetation not much burnt up, but R wanted.

WOOLSTASTON.—A very dry and hot month; springs very low, and want of water much felt. Mean temp. 61° 0.

ORLETON.—A very dry and brilliant month, with warm days, and frequently cloudless but cold nights; very hot from 21st to 28th. Mean temp. about 0°·8 above the average of 24 years. Rainfall the smallest registered in July for 55 years. Pressure high and steady. No T heard or L seen during the month. Hay crop scarcely an average, but secured in fine condition.

LEICESTER.—A very dry month, no R having fallen between June 25th and July 18th; the heat for a few days was very great.

KILLINGHOLME.—A very dry month; there were some very hot days, but the weather at the close was cool and cloudy; pressure high and steady. No T or L.

MANCHESTER.—A fine month, although the temp. in the early part was low. Water is getting low at most waterworks in Lancashire, and some fears of a water famine are entertained.

SEATHWAITE.—Though R fell on only 12 days, the fall averaged nearly 1·00 in. per day. On the two days, 6th and 7th, 6·01 in. fell, and on the two days, 17th and 18th, 4·16 in.

WALES.

HAVERFORDWEST.—The month commenced, as June ended, cloudy and cool generally; nearly an inch of R, which was much needed, fell on 7th, and the temp. continued very low for the time of year till the 19th, when it began to increase, and from the 21st to the close reached 70° every day; after 27th the nights again became very chilly, and continued so to the end; the temp. of the 13th was remarkable, the min. on grass falling to 30°, the lowest recorded in 38 years. Mean temp. rather below the average. Wheat crops looking well, with fine long straw and fair grain; oats and barley also looking well; turnips suffering from the drought. Dense fogs and E. winds from 22nd to 24th produced blight and disease in potato crop.

LLANDUDNO.—A dry, bright month. Mean temp. nearly 1°·0 below the average; monthly range about the average and daily range 2°·0 below it. Rainfall 41 per cent. below the average.

SCOTLAND.

CARGEN.—The first half of the month was unusually cold for the season, but the last 12 days were unusually warm. Mean temp. (58°·1) 1°·5 below the average. Vegetation made rapid progress during the last 10 days; turnip and potato crops looking exceedingly well, and some of the earlier sown oats showing signs of ripening. Aphides of all kinds were unusually abundant on almost all plants, doing much injury to forest trees, fruit trees, &c.

JEDBURGH.—The weather was remarkably dry, the rainfall being 1·45 in. below the average of 20 years. Hay crop good and well secured; cereals good, but on light lands short in straw; root crops good, but on clay lands backward. T only heard twice, and at a great distance. Prevailing winds from 20th to the end, E., N.E. and N.

KILMORY.—I do not remember within recent years such continuous great heat, night and day, as prevailed from the 23rd to the close; during the great heat, pressure sometimes fell slightly during the day and rose at night. There were heavy dews.

OBAN.—The first half of the month showed an excess of rainfall, but the latter half has been unparallelled for sunlight, warmth, and drought for very many years, with the result that the hay crops on this coast are excellent, and the rye grass quite unusual for size and weight. This golden weather was ushered in with constant white cloud fogs lasting for whole days, and of great frequency.

QUINISH.—The first 18 days of the month were particularly cold, wet, and sunless, but on the 22nd heat suddenly set in and continued to the end.

BRAEMAR.—An unusually dry month, crops in consequence very much stinted.

ABERDEEN.—Exceptionally fine weather was the prevailing feature of the month. Rainfall 1·29 in. below the average. T on 3rd and 20th.

CULLODEN.—The almost entire absence of R during the month was remarkable; the weather was very sunny, and on some days the temp. was high, with continuous high pressure; barley colouring very generally at the close.

IRELAND.

DROMORE.—A very fine month; heavy dews at night, with light N. and E. winds prevailing, and sometimes heavy fog in the morning.

KILLALOE.—A month of splendid summer weather, especially in the last half, the max. temp. in shade ranging from 69°·0 to 80°·0; hay harvest made great progress; sheet L at night from 14th to 23rd; mean temp. 63°·6.

DUBLIN.—Very fine, and, for July, unusually dry; rainfall only 46 per cent. of the average; mean temp. only equal to the average, for the great heat of the last ten days was counterbalanced by a cold period from 12th to 20th. Mean temp., 59°·6, precisely the average; pressure above the average. There was no H, nor did electrical disturbances occur near Dublin. Mean humidity, 79; mean amount of cloud, 5·3; prevailing winds W., S.W., and W.N.W.

WARINGSTOWN. — The finest haymaking month remembered. Crops of forced grass enormous; when stooked for seed, as is the custom here, it is almost as tall as wheat. Intense heat prevailed for the last 10 days, the temp. rising to 80° almost every day. Potatoes in bogs were severely cut on the night of 11th though the thermometer on grass here, within half a mile, only registered 39°.

EDENFEL.—A month of almost uninterruptedly warm, and occasionally hot, summer weather; nearly all the R fell on five days, and was less in total amount than the fall in any other July during 21 years except 1868, 1872, and 1878. Hay crop abundant and excellent, and all other crops, except turnips, promise well. The growth of trees and the luxuriance of their foliage and flowering have been particularly remarkable this year. About 30 minutes after sunset on 29th an after-glow of unusual brilliancy occurred, throwing, for over ten minutes, a distinct shadow from trees and other objects.